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Post-sidemental changes of bituminous sandstones: Composition and genesis of cementing material

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Abstract

© SGEM2018. The object of the study was the Ufimian bituminous sands and sandstones in the east of the East European Platform (Russian Federation). Bituminous sands and sandstones are confined to the Sheshmian horizon (Cisuralian, Ufimian Stage of the General Stratigraphic Scale of Russia). Interest in the study of bituminous rocks is associated with the depletion of traditional oil fields. Initially, bituminous rocks were considered as a source of bitumen for road construction, but in recent years they have been involved in development as an independent object for hydrocarbons. In this connection, the questions of studying the lithological features of reservoir rocks become topical. Sand and sandstones have a fairly uniform composition of detrital material. The clastic material is the products of the destruction of the ancient mountain system of the Urals and characterizing by a large amount of fragments of magmatic minerals and their aggregates. Variations in the mineral composition are related to the nature of the cementing material, which is represented by carbonate and carbonate-clay material with different ratios of calcite and dolomite. The formation of carbonate cement occurs in diagenesis under the influence of oil waters. Tectonic processes during the formation of oil-bitumen deposits led to the displacement of cemented areas from the zone of water-oil contact and formation of lithological heterogeneity in the sand horizon. The patterns of changes in the ratio of calcite to dolomite depend on depth and bitumen saturation. One of the most important issues is the origin of calcium and magnesium. The source of calcium is the underground waters of the red-colored Ufimian deposits, which are characterized by alkaline properties. Calcium precipitation occurred during contact with oil waters that have acidic properties. The origin of dolomite has more complex causes and, apparently, is due to its introduction from carbonate formations with a higher content of dolomite lying on deeper horizons.

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Keywords

Bituminous sands, Epigenetic cement, Permian bitumens, Post-sedimental changes, Tar sands

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